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GUIDELINES FOR THE PREPARATION OF OCEAN FACILITIES  
PROGRAM TECHNICALS REPORTS(U) NAVAL FACILITIES  
ENGINEERING COMMAND WASHINGTON DC CHESAPEAKE DIV  
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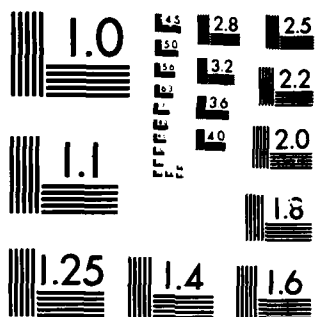
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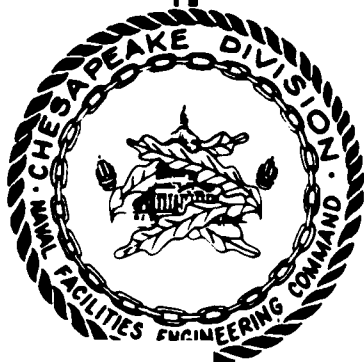
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# GUIDELINES FOR THE PREPARATION OF OCEAN FACILITIES PROGRAM TECHNICAL REPORTS

## DISTRIBUTION STATEMENT A

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FPO-1-77(1)  
November 1976

OCEAN ENGINEERING AND CONSTRUCTION PROJECT OFFICE  
CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
WASHINGTON, D.C. 20374

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This manual governs the publishing of technical, scientific, research, and related publications of the Ocean Engineering and Construction Project Office (FPO-1). The guidelines developed in the manual contain government-wide (con't)

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standards that were developed to ensure that the final product is produced at a minimum expense in the best possible manner.

The format and style characteristics contained herein will promote effective and economical communication among participants in the Ocean Facilities Program (OFP) of the Naval Facilities Engineering Command (NAVFACENGCOM).

The writers of OFP technical reports should strive to meet the following objectives by providing:

Logical and consistent technical information to <sup>the</sup> reader who may be unfamiliar with the particular area of technology being presented.

Accurate technical information that is written in a clear, concise, and meaningful manner, and that is accompanied, where possible, by effective illustrations, charts, and graphs.

A means for technology transfer and for the advancement of the state of the art within in OFP.

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## CHAPTER 1. REPORT CONTROLS

1. APPLICATIONS OF STANDARDS IN THE FIELD. NAVFAC P-346, "Publishing for the Naval Facilities Engineering Command," contains the standards, criteria, procedures, and specifications that are applicable to publications developed in field offices as well as in the headquarters command. These format and production considerations are designed to facilitate the production of the maximum amount of material in house without the need of resorting to contract effort and the lead times involved. NAVFAC P-346 states that:

"On publications designed to be issued by a field activity and that cover only the field activity's area of responsibility, each field office should establish an internal system to accomplish a review and clearance within the scope and intent of this publication."

2. CLEARANCE AND APPROVAL. All persons in FPO-1 who are responsible for the development of a publication shall ensure that the document is technically accurate and that it passes through the appropriate chain of command.

a. Chain of Command. The chain of command for the review process of technical documents published by FPO-1 is as follows:

- (1) Technical writer(s) (engineer(s))
- (2) Division head(s)
- (3) Editor
- (4) Department Head (FPO-1)

In those areas where there is a crossover in areas of technical expertise, appropriate division heads will review the technical accuracy of the document.

b. Clearance and Release. FPO-1 will release for publication all reports emanating from the FPO-1 Department.

### 3. PUBLICATION DEVELOPMENT.

a. Writers and Division Heads. Engineers (writers) and division heads who take part in the preparation of a technical document are required to take the following actions.

- (1) Determine that the publication is needed and who needs it.

(2) Keep the publication's distribution on a "need to know" only standard.

(3) Research the technical material to determine whether enough information is at hand or whether new technical material is needed.

(4) Acquire the new technical material.

(5) Make a continuing technical review until all necessary information is at hand. Assure that the information is being gathered in house or by contract.

(6) Assist in the scope of work when contract assistance is required, and ensure that each contractor should refer to FPO-1-77(1) and NAVFAC P-346 for the technical document's preparation.

(7) Review the draft manuscript for technical completeness.

(8) Clear the draft of the publication with other areas of interest.

(9) Ensure that the references cited are accurate.

(10) Check to see that copyrighted material is properly used.

(11) Ensure that the material does not duplicate material issued by another part of the government.

b. Editor. The editor will:

(1) Review the draft to ensure that its sections are in logical order, clear, easy to read, and sufficiently illustrated.

(2) Eliminate unnecessary or repetitive information.

(3) Ensure that the manuscript meets the requirements cited in Chapter 3, "Report Style."

(4) Ensure that indexes or bibliographies have been developed as an aid to the user.

c. FPO-1. FPO-1 will:

(1) Ensure that the document's content is technically accurate and cleared by all responsible officials in the technical subject areas discussed.

(2) Ascertain that security has cleared the material.

(3) Ensure that the publication does not damage the Navy's image, and that good taste is reflected throughout.

## CHAPTER 2. REPORT FORMAT

### 1. PRINCIPAL PARTS OF A PUBLICATION.

a. Report Elements. OFP technical reports may contain the following elements in the order shown:

- (1) Cover
- (2) Distribution list
- (3) Title page
- (4) Abstract
- (5) Preface
- (6) Foreword
- (7) Table of Contents
- (8) List of Figures
- (9) List of Tables
- (10) Acknowledgements and Credits
- (11) Text
- (12) References
- (13) Bibliography
- (14) Glossary
- (15) Appendixes
- (16) Indexes

b. Guidelines. The guidelines presented in this chapter are applicable to all types of OFP technical reports. The reports may include a documentation of state of the art studies, research and development projects, component design studies, requirements analyses and the development of test/calibration and installation procedures, project execution plans, and project completion reports. The guidelines for report or publication format for unusual or special cases will be handled on a document-by-document basis.

## 2. COVER.

a. Cover. A sample cover is shown in the figures at the end of this chapter (Figure 2-1). Report titles should be as brief as possible and still convey the report's substance. All publications will carry the identification (logos) of the Chesapeake Division, Naval Facilities Engineering Command, and follow the format arrangement shown in Figure 2-1.

b. Distribution List. The distribution list contains, in abbreviated form, the information addressees for those who have a need to know the report's information. The list also identifies where the surplus copies of the report are stocked. Use of the distribution list, which appears on the inside of the front cover (Figure 2-2), is optional.

3. FRONT MATTER. Material from the cover to the first page of text is usually referred to as front matter.

a. Title Page. The title page contains information similar to the cover yet it also includes report author(s), office of origin, and project order number. The title page is used when documents have been contracted for under a scope of work. Title pages are not used when documents are produced in house. See Figure 2-3 for the page's arrangement.

b. Abstract. An abstract is a brief statement in summary form. The abstract covers the complete subject matter and tells what the report is about and what conclusions have been reached. It should be to the point and contain approximately 150 words. See Figure 2-4. An abstract must always be included in a technical report. Keywords identifying the main subjects in the OFP report will be selected from the abstract for inclusion in the keyword index.

c. Preface. A preface is rarely used. Written by the text's author, the preface tells the reader why the publication was prepared, to whom it is directed, and how to use the information it contains (Figure 2-5).

d. Foreword. A foreword is only used when the product is being endorsed by an authority higher than the originator. Forewords are written by a person other than the author, usually by a person at the command level. The purpose of the foreword is to reference previous books in a series (see Figure 2-6), cancel superseded items, acknowledge assistance received, welcome suggestions from the readers, and contain a certification statement.

e. Contents, Figures, Tables. Figures 2-7, 2-8, and 2-9 reflect the format to use for the Contents, List of Figures, and List of Tables, respectively. The contents is a breakdown of the principal parts of a

document, including all the material that follows the text. The lists of figures and tables are particularly important in OFP technical reports. This information aids in the effective utilization of the data by the participants in the OFP.

f. Credits or Acknowledgements. Courtesy credit lines are permissible for uncopyrighted materials contributed or loaned by nongovernment parties. Credits are not given when materials have been purchased by the Command. If the Command desires to credit individuals, private companies, or federal agencies for text, data, artwork, the loan of employees, or other services, the credits should be listed as concisely as possible under a paragraph heading, "ACKNOWLEDGEMENTS," at the end of the front matter.

4. TEXT. Proper outlining and subdividing of the material to be presented in the OFP report will result in a quality report useful to many readers. The text should, therefore, be divided into logical subject breakdowns. Each breakdown should have a meaningful title. See Figure 2-10 for a sample of a completed manuscript page.

a. Guide to Outlining for Lengthy Reports. The following general outline is a checklist for OFP technical report writers. This list will serve as a guide in organizing material in a manner suitable for the transfer of technology and the expansion of the knowledge base within the OFP. Deviations from this guide are expected.

1. EXECUTIVE SUMMARY. (To be used for a lengthy report)

a. Description of Work Performed (Summarize)

b. Results and Conclusions (Summarize)

c. Recommendations (Summarize)

2. TECHNICAL APPROACH.

a. Statement of the Problem. Briefly state objectives and define area of investigation; describe mission, system, component or element involved.

b. Technical Analysis. Describe procedure or method used to solve problem or conduct investigation.

Include under the technical analysis, if appropriate, the:

(1) State of the art review.

(2) Factors considered - environmental, physical and performance requirements and constraints.



- (3) Design criteria used.
- (4) Performance calculations (provide formulae used).
- (5) Parametric analyses (present in graph form).
- (6) Tradeoff studies.

3. RESULTS AND CONCLUSIONS. Describe results and provide data supporting conclusions. Show performance data parametrically. Indicate on graphs the areas which represent both state of the art and advanced technology.

4. PROBLEM AREAS. Discuss problem areas encountered, how they were approached, and whether they were solved or not solved. Point out alternate methods that were tried, or should have been tried. If there were no problem areas, state "NONE." Be sure to note any areas of caution, especially if the work involves hazardous materials. Clearly state unsafe measures in the form of "Warnings." If there are any special constraints involved, mention these. The text of cautions, warnings, and other emphases should be flush left and typed in block form for vital emphasis, using a colon after the precautionary word, as follows:

CAUTION: Do not use toluol, acetone, or ethanol to clean plastic widgets.

5. TECHNOLOGY REQUIREMENTS. Identify special equipment or test facilities required. Indicate the use of special computer programs or simulation facilities.

6. TECHNOLOGY ADVANCEMENT.

a. Accomplishments. Discuss breakthroughs or significant accomplishments with respect to their applicability in similar situations. This is an important section. Do not underestimate the value of the work performed. Publicize it here!

b. Requirements. It is also important in the overall development of capability within the OFP to note areas requiring some form of technological advancement; discuss the degree of advancement required with respect to near or long-term projects.

7. RECOMMENDATIONS. Suggest improvements in methods; follow-on efforts, or redirection of efforts.

b. Guide to Outlining for Short Reports. If the report is short, less than 10 pages, the following headings will prove to be sufficient:

(1) Introduction. Include background information on the problems under study, references to the past history of the project, and other material that will contribute to the reader's understanding of the subject matter. The introduction may be detailed or condensed, depending on the audience. Also include the objectives of the study or report, the statement of the problem, and its planned approach.

(2) Discussion. This would be the main portion of the report or publication. Include, in detail, such factors as equipment and procedures used and experimental results (if any). Since this is the main thrust of the report, sections and subsections would depend on the length and complexity of the subject matter.

(3) Conclusions or Recommendations. When significant findings are reported, conclusions are a necessary part of a publication. Negative results or failure to obtain results should also be reported. Recommendations based on the results of the study may be included under conclusions, or they may be placed in a separate section for reasons of length or emphasis.

c. Subdivisions. Subdivisions may be identified by number (decimal style) or letter and number (thesis style). Figure 2-10 uses the thesis style. The following are examples of thesis and decimal styles:

Thesis style:

- 1. XXXX XXXX XXXX XXXX XXXX XXXX.
  - a. XXXX XXXX XXXX XXXX XXXX XXXX.
    - (1) XXXX XXXX XXXX XXXX XXXX XXXX.
      - (a) XXXX XXXX XXXX XXXX XXXX XXXX.
        - i. XXXX (Lower case Roman numerals.)
          - a. XXXX XXXX XXXX XXXX XXXX XXXX.

Decimal style:

- 1 XXXX XXXX XXXX XXXX XXXX.
  - 1.1 XXXX XXXX XXXX XXXX XXXX.
    - 1.1.1 XXXX XXXX XXXX XXXX XXXX.

(1) Chapters. All chapters are numbered consecutively. Chapter headings are capitalized and centered; the chapter number is separated from the title by a period. In titling chapters, avoid vague headings such as "General" or "Introduction."

(2) Sections. Section headings, when used, are similar to chapter headings except that the word "Section" is in lower case type with an initial capital. Both chapters and sections are numbered with Arabic numerals followed by a period. The use of sections within a chapter should be avoided unless the additional breakdown is necessary, to separate distinct parts.

(3) Paragraphs. Primary paragraph headings are in capital letters, followed by a period. The paragraph numbers are typed "flush left" (on the left vertical line of the text) and not indented.

(4) Subparagraphs. Paragraphs may be divided into subparagraphs, with headings in capitals and lower case letters. Subparagraphs are lettered consecutively within the numbered primary paragraph.

(5) Series Listings. When they occur, they are identified by consecutive letters, with a number (see Figure 2-11), or with bullets. Bullets may be used in column listings when no reference is subsequently made to these items. The spacing is the same as for numbered or lettered listings. The device of bullet introductions lends attractiveness and variation to the format. In some instances, they serve to emphasize the items under consideration. For example:

- Research
- Weapon Systems
- General Services
- Space Systems
- Project Systems

5. BACK MATTER. Back matter refers to that material supplementary to the text and organized separately from it. The back matter contains reference information which may be needed by the user. Back matter is organized in the sequence described in the following subparagraphs.

a. References. References are listed on the first page following the end of the text, in the order in which they appeared in the text. Each reference is begun on a new line and numbered consecutively with an Arabic numeral followed by a period. Entries are made in the same format as in the bibliography described in the following subparagraph. See Figure 2-12.

b. Bibliography. The bibliography provides the reader with a list of publications used in preparing the document, or recommended for supplementary reading by the user. Bibliographies are usually arranged

alphabetically and are not numbered; however, other arrangements -- such as groupings by subject -- may be used if they are of greater service to the reader (Figure 2-13).

c. Glossary. A glossary is used for specific technical definitions peculiar to users of the text. The glossaries prepared for each OFP technical report provide the basis for establishing a standard usage of terminology within the OFP. From each glossary, definitions will be reviewed and selected for inclusion in the FPO-1 Master Glossary. The definitions in the Master Glossary will be those that are considered accepted for standard use in the OFP. When writing the technical report the unusual terms will be defined in the text or as a footnote, and also presented in the glossary. The terms in the glossary will be listed in alphabetical order. See Figure 2-14 for a sample glossary.

d. Appendixes. An appendix is any material appended to a publication for further illustration or information. The material in appendixes is not essential to a complete understanding of the text, but amplifies it. Appendixes may occur in various forms, depending on the type of material presented and the source document. If more than one appendix is inserted, they are identified as Appendix A, Appendix B, and consecutively thereafter. Each appendix is preceded by a title page which has an identifying letter with the title centered two spaces below.

6. FIGURES. Illustrations are identified by Arabic numerals, with the figure number centered above the title. Figures are numbered consecutively within chapters, with the first digit indicating the chapter number and the second number showing the sequence of the figure within the chapter. Number and title appear at the bottom of the figure. (In the draft manuscript, figures may be any convenient copies of intended illustrations, rough sketches or proposed artwork, or a description of the desired illustration.) See Figure 2-15.

7. TABLES. Tables are used to present tabular information inconvenient to present in any other form. Like figures, they are numbered consecutively within chapters, using Arabic numerals. Unlike figures, the table number and title are placed at the top of the table. In their final form, tables are boxed by ruled lines; this is not required in draft manuscripts. There are two basic types of tables: formal tables, and informal (or "run-in") tables. Formal tables are numbered and titled; informal tables are related directly to the text and are centered within the text and read with it for purpose of emphasis. See Figures 2-16 and 2-17.

#### 8. OTHER SUPPORTING DATA.

a. Footnotes. Footnotes are numbered consecutively within the text and within each table. In manuscripts, footnotes are separated from the

text by a 2-inch horizontal line to separate the footnote from the last line of text on the page. Footnotes to tables are below and outside the table's border. A footnote is a comment placed below the text. They should be used sparingly. It is an annoyance to a reader to have to drop down to read a footnote which, in many cases, should have been incorporated in the text itself.

b. Index. A comprehensive subject index may be included in all publications over 100 pages in length, and may be included in shorter publications if an index is of greater usefulness to the reader than an elongated table of contents. Indexes are in alphabetical order with page numbers of the completed (not the manuscript) text. See Figure 2-18.

c. Excerpts. Excerpts from other documents used in the text are typed in quotations, in block form, with an 8-space indentation:

*"The extensive use of widgets in civilian industry is a direct result of their military applications in the 1960's."*

The author is responsible for the identification of all matter quoted from another's work.



**GUIDELINES FOR THE PREPARATION  
OF OCEAN FACILITIES PROGRAM  
TECHNICAL REPORTS**

**FPO-1-77(1)  
November 1976**

OCEAN ENGINEERING AND CONSTRUCTION PROJECT OFFICE  
CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
WASHINGTON, D.C. 20374

FIGURE 2-1  
Sample Cover

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**FIGURE 2-2**  
**Sample Distribution List**

**GUIDELINES  
FOR THE PREPARATION OF  
OCEAN FACILITIES PROGRAM  
TECHNICAL REPORTS**

J. HERRINGTON  
C. FELLOWS

November 1976

Developed For  
CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
OCEAN ENGINEERING AND CONSTRUCTION PROJECT OFFICE  
WASHINGTON NAVY YARD  
Under Project Order N62477-75-P05-0021

FIGURE 2-3  
Sample Title Page



### ABSTRACT

Design criteria for use by experienced architects and engineers are presented on facilities covered by category class 600. The contents include criteria for Navy and Marine Corps administration buildings and related facilities (architectural requirements, mechanical and electrical requirements, areas housing vital electronic equipment, and requirements for security and restricted areas), and designs and types of flagstaffs.

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FIGURE 2-4  
Sample Abstract

## PREFACE

Design criteria are presented in this publication which apply only to administrative facilities covered by the codes in facility class 600. Those criteria which are applicable to both facility class 600 and to other facility classes are presented in the basic manuals covering the various fields of engineering and architecture. These criteria, together with the definitive designs and guideline specifications of the Naval Facilities Engineering Command, constitute the Command's design guidance. These standards are based on functional requirements, engineering judgment, knowledge of materials and equipment, and the experience gained by the Naval Facilities Engineering Command and other commands and bureaus of the Navy in the design, construction, operation, and maintenance of naval shore facilities.

The design manual series presents criteria that shall be used in the design of facilities under the cognizance of the Naval Facilities Engineering Command. The direction and standards for procedures, methods, dimensions, materials, loads, and stresses will be included. Design manuals are not textbooks, but are for the use of experienced architects and engineers. Many criteria and standards appearing in technical texts issued by Government agencies, professional architectural and engineering groups, and trade and industry groups are suitable for, and have been made integral parts of, this series. The latest edition of each publication source shall be used.

To avoid duplication and to facilitate future revisions, criteria are presented only once in this series as far as possible. Criteria having general applications appear in the basic manuals numbered DM-1 through DM-9. Manuals numbered DM-21 and above contain criteria that usually are applicable only to the specific facility class covered by each manual. When criteria for one facility also have an application in another facility class, the basic rule has been to present such criteria in the basic, or lowest numbered, manual and cite it by reference where required in later manuals.

The specific design manuals (DM-21 and above), with but three exceptions, list design criteria for specific facilities in the order of the category codes. The exceptions are:

- (1) Drydocking Facilities, NAVFAC DM-29, which includes both Category Codes 213 and 223.
- (2) Criteria for facility class 800, Utilities and Ground Improvements, which have been included in the basic manuals on mechanical, electrical, and civil engineering.
- (3) Weight Handling Equipment and Service Craft, NAVFAC DM-38, which includes the design criteria for these facilities under the cognizance of the Naval Facilities Engineering Command that are not classified as real property. These include weight and line handling equipment, dredges, yard craft, and pile driving equipment.

For the effective use of these criteria, the designer must have access to:

- (1) The basic and specific design manuals applicable to the project. See list on page 34-viii.
- (2) Published criteria sources.
- (3) Applicable definitive designs, Definitive Designs for Naval Shore Facilities, NAVFAC P-272.
- (4) Command guideline specifications.

FIGURE 2-5  
Sample Preface

## FOREWORD

This design manual for administrative facilities is one of a series developed from an extensive reevaluation of facilities in the shore establishment, from surveys of the availability of new materials and construction methods, and from selection of the best design practices of the Naval Facilities Engineering Command, other Government agencies, and private industry. This manual includes a modernization of the former criteria, and the maximum use of national professional society, association, and institute codes. Deviations from these criteria should not be made without the prior approval of the Naval Facilities Engineering Command Headquarters (NAVFAC HQ).

Design cannot remain static any more than can the naval functions it serves or the technologies it uses. Accordingly, Administrative Facilities, NAVFAC DM-34, of March 1975, cancels and supersedes Administrative Facilities, NAVDOCKS DM-34, of July 1967, in its entirety, and all changes issued.



A. R. MARSCHALL  
Rear Admiral, CEC, U.S. Navy  
Commander  
Naval Facilities Engineering Command

FIGURE 2-6  
Sample Foreword

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## CHAPTER 2. HELIUM PLANTS AND STORAGE

### Section 1. DESIGN CRITERIA

1. **SCOPE.** Data and criteria in this chapter shall govern the design of helium storage, repurification, and distribution facilities.

2. **RELATED CRITERIA.** Other criteria related to helium appear elsewhere in this DM series. See these sources:

<u>Subject</u>	<u>Source</u>
Compressed air . . . . .	NAVFAC DM-3
Fire protection engineering . . . . .	NAVFAC DM-8
Plumbing, heating, and ventilating . . . . .	NAVFAC DM-3

3. **INFORMATION REQUIRED FOR DESIGN.** Obtain the following data on the project:

- (1) Schematic flow diagram, for desired operating features.
- (2) Plot plan of project, to supply location of buildings, railroads, thoroughfares, and interferences and terrain.
- (3) Duration of requirements, for working time and standby time.
- (4) Volumetric, pressure, and temperature requirements.
- (5) Local material and labor construction costs.
- (6) Soil conditions.
- (7) Weather and climatic conditions.

4. **FACTS ON HELIUM.** Federal agencies use helium in helium-shielded arc welding, supersonic wind tunnel, and atomic reactors; and for nuclear cryogenic and guided missile work. Industrial, medical, scientific, and research organizations use some helium on essential projects.

a. **Production.** The Department of the Interior, Bureau of Mines is the only supplier of helium. About 60,000,000 cubic feet at 70°F and 14.7 pounds per square inch absolute (psia) of Grade A helium is produced annually from natural gas in its five plants. The Bureau of Mines sells helium to other Federal agencies (and to private industry at a slightly higher cost) in accordance with Title 30, Code of Federal Regulations. It is anticipated that the Bureau of Mines can meet helium needs, before depletion, to the year 2000.

b. **Shipping Facilities.** Helium is shipped from the production plants in railroad tank cars containing thirty 18-inch diameter by 33-foot long, seamless steel cylinders (meeting Interstate Commerce Commission (ICC) Specification 107A requirements), with a total volume of about 1225 cubic feet. At 3600 pounds per square inch gage (psig), this volume represents 300,000 cubic feet of helium gas at 70°F and 14.7 psia; at 2400 psig, it represents 200,000 cubic feet.

c. **Characteristics.**

(1) **Grade A Helium.** This grade, as received in tank cars, is 99.995 percent pure. It is a mono-atomic, chemically inert gas, colorless, odorless, tasteless, and nonflammable. Other characteristics are:

FIGURE 2-10  
Sample Text Page with Chapter, Section, Primary Paragraph  
and Subparagraph Headings

**3. ARCHITECTURAL REQUIREMENTS.** The building requirements criteria of Supply Facilities NAVFAC DM-32, shall be followed except as modified herein. As described in Facility Planning Factors for Naval Shore Activities, NAVFAC P-80, the type of air cargo terminal is selected on the basis of the weight of cargo to be processed through the terminal each day. Definitive Designs for Naval Shore Facilities, NAVFAC P-272, depicts a small, nonmechanical (7,720 square feet) air cargo terminal for processing up to 20,000 pounds of cargo daily and a typical medium, mechanical terminal (44,500 square feet) for handling up to 100,000 pounds of cargo daily. See Structural Engineering, NAVFAC DM-2, for basic structural design considerations. Floors shall be designed to carry the superimposed loads of conveyors or vehicles.

a. **Special Flooring.** Provide removable panel type raised flooring in the computer room. For floor loadings, see NAVFAC DM-2. Adequate clearance shall be provided between finished floor panels and the subfloor, to accommodate wiring and insulated piping.

b. **Partitions.** Movable partitions shall be used in the offices and computer rooms to allow for maximum flexibility.

c. **Acoustical Treatment.** Include acoustical treatment in the offices and computer room.

d. **Weighing Scales.** Floor scales are required in the vicinity of palletization pits and the aircraft loading dock. Conveyor scales are required at the receiving truck docks.

**4. FUNCTIONAL SPACES.** Air cargo terminal operations include receipt of cargo, control documentation, palletization, hold for shipment aircraft loading and unloading, package sorting, and loading on trucks. Approximately 99 percent of the air cargo can be moved about the terminal on conveyors. Standard pallets and containers are moved, stored, and loaded mechanically in an integrated system which may include roller, belt, and dragline conveyors, as well as by forklifts, scissor lifts, and overhead hoists. Mechanical systems may be automated and computer controlled. Standard pallet dimensions are as follows:

Military airlift pallet	88 x 108 inches.
Military airlift half-pallet	88 x 54 inches.
Commercial air pallet	88 x 125 inches.
Warehouse pallet	40 x 48 inches.

The majority of Navy cargo air shipments through the air cargo terminal are on military airlift half-pallets. Warehouse pallet loads may be consolidated onto airlift pallets without being first depalletized. Explosives are loaded and off-loaded at the ordnance handling pad, and are not processed through the air cargo terminal.

a. **Small Terminal Spaces.** Small, nonmechanical air cargo terminals shall be provided with the following spaces:

- (1) Receiving and shipping truck docks.
- (2) Sorting, accumulation, storage, and palletization areas for palletizable cargo.
- (3) Rework area: covered storage area where through-cargo may be consolidated with originating cargo during aircraft terminal time.
- (4) Aircraft loading/unloading platform.
- (5) Depalletizing, packing and crating, and hold areas. Terminating cargo arriving by air is processed through the terminal, and provision is also made for packing and crating depalletized cargo for onward shipment.
- (6) Special handling cargo area: space for separate processing and secure storage of special cargo, including a vault.
- (7) Administration.

b. **Spaces for Conveyor Systems.** Spaces shall be provided in mechanical air cargo terminals utilizing conveyor systems in accordance with Table 1-2.

**5. EXTERIOR PAVEMENT.** The road access to the air cargo terminal must not be less than 80 feet to the face of the building, to provide maneuvering area for trailer trucks. The apron access to the air cargo terminal must be paved for the operation of mobile K-loaders up to 55,000 pound capacity. For parking area space criteria, See NAVFAC P-272, Part 2, and DOD 4270.1-M (Criteria Sources).

1-5

FIGURE 2-11  
Sample Series Listing



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2. Webster's New International Dictionary, latest unabridged edition, G. & C. Merriam Company, Springfield, Massachusetts.
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4. Department of the Navy Publications and Printing Regulations, NAVEXOS P-35, Revised July 1958.

Reference-1

FIGURE 2-12  
Sample Reference List

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Bibliography-1

FIGURE 2-13  
Sample Bibliography

#### GLOSSARY

Acoustic Power	The rate at which energy is delivered to the atmosphere by an acoustic source. The acoustic power depends on the square of the vibration amplitude, and also on the square of the frequency of vibration.
Acrylic	Synthetic rubber and exceptionally clear, light-weight plastics, resistant to weather and corrosion, produced from any of numerous thermoplastic or thermosetting polymers or copolymers of acrylic acid, methacrylic acid, esters of those acids, or acrylonitrile.
Anoxia	A lack of oxygen of such severity or duration that permanent damage may result.
Anthropometric	Pertaining to the science of measuring the human body, its parts, and its functional capacities as an aid to the study of human physical development and variation.
Aperture	A hole, gap, slit, or other opening that limits the amount of light passing through.
Appurtenance	An item added to a more important object; e.g., viewport, hatch, deadlight, etc.
Autoclave	An airtight chamber that can be filled with steam or placed within a steam-filled chamber, and which generally is used for sterilizing or other purposes when temperatures above 212 F are required.
Binaural	Pertaining to directional techniques and systems that utilize the placement of sound sources to achieve, in sound reproduction, the effect of hearing the sound sources in their original positions.
Cascade	Arrangement in a series of steps, such as a succession of stages in which each stage derives from, or acts upon, the output of the preceding stage.

Glossary-1

FIGURE 2-14  
Sample Glossary

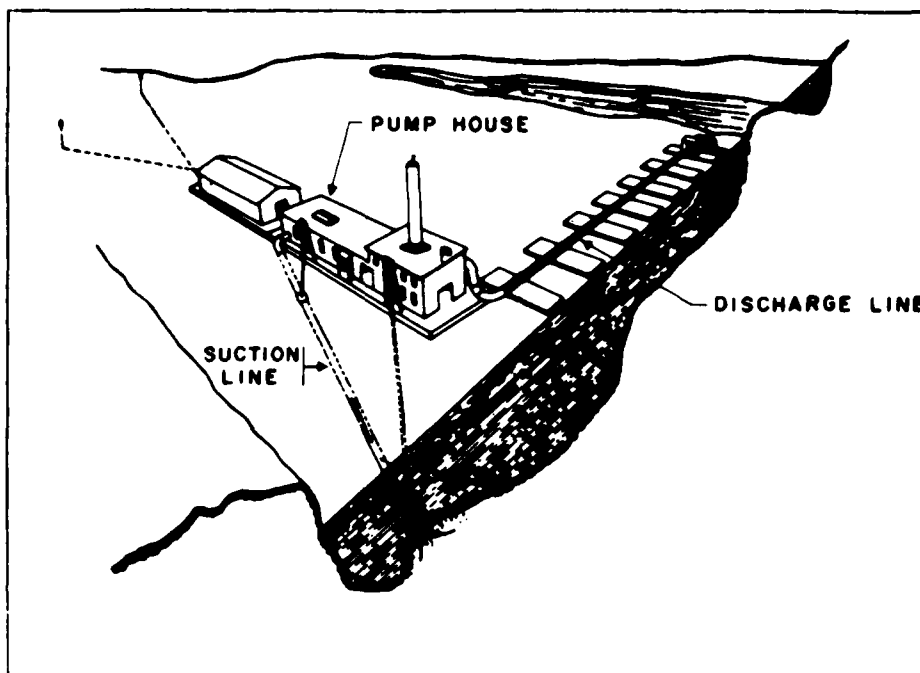


FIGURE 2-9  
Typical Pump Barge Dredging Operation

FIGURE 2-15  
Sample of Figure Number and Title Placement

**TABLE 4-6**  
**Flow Capacities for Oxygen in Schedule 40 Steel Pipe<sup>1</sup>**

Distance of pipe, far end from supply unit (ft)	cu ft of gas per hr at 14.7 psia and 70° F							
	Nominal pipe size (in.)							
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3
50.....	1,390	2,760	5,170	10,200	15,000	28,100	43,600	75,600
100.....	990	1,950	3,650	7,200	10,700	19,900	31,100	53,700
150.....	810	1,590	2,960	5,990	8,900	16,600	25,800	44,700
200.....	700	1,510	2,570	5,140	7,620	14,300	22,200	38,300
250.....	630	1,230	2,310	4,500	6,750	12,500	19,400	33,500
300.....	570	1,130	2,100	4,240	6,290	11,700	18,200	31,500
350.....	510	1,040	1,960	3,800	5,620	10,500	16,300	28,300
400.....	490	980	1,820	3,600	5,340	9,960	15,550	27,100
450.....	470	920	1,720	3,430	5,080	9,500	14,790	25,800
500.....	450	870	1,640	3,270	4,850	9,080	14,150	24,300
600.....	390	790	1,480	2,920	4,360	8,140	12,650	21,900
800.....	350	690	1,280	2,570	3,810	7,120	11,500	19,200
1,000.....	310	610	1,140	2,250	3,330	6,230	9,700	16,800
1,200.....	280	560	1,060	2,060	3,050	5,690	8,870	15,400
1,500.....	250	510	950	1,860	2,740	5,120	7,960	13,700
2,000.....	220	440	820	1,600	2,370	4,440	6,910	11,950
2,500.....	190	390	730	1,440	2,140	3,690	6,200	10,700
3,000.....	180	350	670	1,310	1,940	3,630	5,630	9,800
3,500.....	170	340	620	1,220	1,810	3,380	5,270	9,100
4,000.....	150	305	580	1,150	1,690	3,170	4,940	8,540
4,500.....	140	290	540	1,080	1,590	2,980	4,630	8,010
5,000.....	130	275	520	1,020	2,810	2,810	4,370	7,560
Pipe content in cu ft per 100 lin ft								
	0.21	0.37	0.6	1.04	1.41	2.33	3.32	5.13

<sup>1</sup> Supply unit delivery pressure 100 psi. Actual cubic feet per hour of gas converted to cubic feet per hour measured at 14.7 psia and 70°F.

FIGURE 2-16  
Sample Formal Table

along a circumferential line of the shell. Membrane stress, whether in the  $\phi$  or  $\theta$  direction, is an average stress assumed to act uniformly through the thickness of the shell. This is true of course for all the models.

(b) Model No. 2. This model as shown in Figure 1-12 is composed of 13 parts as follows:

Part No.	Type of Shell	Thicknesses, Inches
1	Sphere	2.0
2	Sphere	2.0
3	Sphere	Variable (to model the taper transition joint and part of the reinforcement)
4	Torus	Variable (geometrically, a spherical section and a cylindrical section)
5	Cylinder	1.0
6	Cylinder	1.0
7	Cylinder	Variable (to model the flange taper transition)
8	Torus	Variable (geometrically a flat rectangular ring modeling part of the flange)
9	Conical	1.5 (rest of flange)
10	Conical	1.5 (same as 9)

Figure 1-16 shows a detail of the geometric model of the 40.0 inch diameter reinforcement configuration which is composed of Parts 3, 4, and 5 from Model No. 2. Again notice the close geometric modeling.

The loadings and boundary conditions applied to Model No. 2 are shown in Figure 1-12. The two 11,000 lb/in. ring loads shown acting at the junction of Parts 8-9 and 10-11 represent the simulated bolt or clamp loads. The internal pressure was set at 1000.0 psig. The boundary condition at the edge of the shell represents the symmetry condition found along any diametral line in a uniform sphere under uniform internal pressure. Some of the maximum stresses and the location and direction in which they act are shown in Figures 1-16 and 1-17.

(c) Model No. 3. This model, as shown in Figure 1-13 is composed of four parts as follows:

Part No.	Type of Shell	Thicknesses, Inches
1	Sphere	2.0
2	Sphere	2.0
3	Conical	Variable (to model the taper transition and part of the reinforcement)
4	Conical	4.0

The loadings and boundary conditions applied to model No. 3 are shown in Figure 1-13. The basic loading was 1000 psig internal pressure. The additional 446 psig pressure shown acting upon Part 4 represents the bearing

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FIGURE 2-17  
Sample of Informal Tables Within Text

## ADMINISTRATIVE FACILITIES

### INDEX

<b>A</b>		<b>Administration building (continued).</b>
<b>Acoustics, modernization</b> . . . . .	34-1-8	<b>Electronic equipment areas (continued).</b>
See Administration buildings, Moderni- zation.		<b>Construction (continued).</b>
<b>Administration buildings</b> . . . . .	34-1-1	Windows . . . . .
<b>Architectural requirements</b> . . . . .	34-1-2	Controls, instruments, and alarms . . . . .
Design Character . . . . .	34-1-2	Alarms . . . . .
Design factors . . . . .	34-1-2	Instruments . . . . .
Arrangement, functional . . . . .	34-1-2	Underfloor systems . . . . .
Circulation . . . . .	34-1-3	<b>Design information</b> . . . . .
Communications areas . . . . .	34-1-3	Comfort conditions . . . . .
General offices . . . . .	34-1-3	Summer . . . . .
Private officer . . . . .	34-1-3	Winter . . . . .
Reception area . . . . .	34-1-2	Humidity variations . . . . .
Supporting areas . . . . .	34-1-3	Summer . . . . .
Equipment dimensions and clearances . . . . .	34-1-3	Winter . . . . .
Drafting equipment . . . . .	34-1-3	Humidity variations, rate . . . . .
Office equipment . . . . .	34-1-3	<b>Operational period</b> . . . . .
Expansion . . . . .	34-1-3	Humidity . . . . .
Square footage . . . . .	34-1-3	Temperature . . . . .
<b>Criteria, related</b> . . . . .	34-1-1	Nonoperational period . . . . .
<b>Electronic equipment areas</b> . . . . .	34-1-4	Humidity . . . . .
Air distribution . . . . .	34-1-6	Temperature . . . . .
Return air system . . . . .	34-1-6	Tape storage . . . . .
Single duct system . . . . .	34-1-6	Temperature variations . . . . .
Two-duct system . . . . .	34-1-6	Summer . . . . .
<b>Alarms</b> . . . . .	34-1-7	Winter . . . . .
See Controls, instruments and alarms.		Temperature variations, rate . . . . .
<b>Architectural requirements, general</b> . . . . .	34-1-4	<b>Fire protection</b> . . . . .
Applicability . . . . .	34-1-4	Filters . . . . .
Equipment . . . . .	34-1-4	Heating requirements . . . . .
Data processing machines, electronic . . . . .	34-1-4	Humidification . . . . .
Radio receivers . . . . .	34-1-4	Instruments . . . . .
Teletypes . . . . .	34-1-4	See Controls, instruments, and alarms.
Transmitting equipment . . . . .	34-1-4	Noise and vibration . . . . .
Location . . . . .	34-1-4	Noise level . . . . .
<b>Construction</b> . . . . .	34-1-4	Vibration . . . . .
Ceilings . . . . .	34-1-5	System design . . . . .
Floors . . . . .	34-1-5	Air conditioning equipment, location . . . . .
Insulation . . . . .	34-1-5	Reheat . . . . .
Partitions . . . . .	34-1-5	Standby . . . . .
Walls, exterior . . . . .	34-1-4	Zoning . . . . .
		Vibration . . . . .
		See Noise and vibration.
		Ventilation . . . . .
		Ventilating requirements . . . . .

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FIGURE 2-18  
Sample Index

### CHAPTER 3. REPORT STYLE

1. RULES. Report style encompasses certain editorial rules, standards, and conventions that have been established in the field of technical writing. Table 3-1 shows the references which will be used as guides for rules applicable to abbreviations, symbols, units, punctuation, compound words, capitalization, spelling, division of words, tables, and illustrations.

TABLE 3-1  
Style Guide References

Reference Document	For Guidance On
<u>The Government Printing Office Style Manual</u> , Washington, D.C. (latest edition)	Capitalization    Signs Compound Words    Symbols Punctuation
<u>Webster's New Collegiate Dictionary</u> or <u>Webster's New International Dictionary</u> (latest edition), G&C Merriam Co., Springfield, Mass.	Spelling Definitions Word Division
<u>Military Standard Abbreviations for Use on Drawings and in Technical-Type Publications</u> , MIL-STD-12 (latest issue), DoD Standardizations Division, Armed Forces Supply Support Center, Washington, D.C.	Technical Abbreviations Signs Symbols
NAVFAC P-346, <u>Publishing for the Naval Facilities Engineering Command</u> , Aug 76	Style Printing
<u>Word Division Supplement to the Government Printing Office Style Manual</u>	Spelling Word Division
<u>Dictionary of United States Military Terms for Joint Usage</u> , JCS Pub. 1 (latest issue)	Abbreviations

2. FOREIGN WORDS AND PHRASES. Foreign words and phrases should be held to a minimum.

3. ABBREVIATIONS. Abbreviations should also be held to a minimum. They may be used in the second and subsequent reference, but in the first it



is an obligation of the writer to spell out the full name and add the abbreviation in parentheses (Government Printing Office (GPO)). See Figure 3-1.

4. EQUATIONS AND FORMULAS. For the use of signs and symbols, follow the GPO Style Manual (Figure 3-2). Equations and formulas are centered from each side on the page, two spaces below and two spaces above the text. They are identified by the term EQUATION or FORMULA typed flush left and followed by a colon. Equations and formulas are numbered consecutively within each chapter (1-1, 1-2, etc.) with the numbers enclosed in parentheses:

EQUATION: 
$$\sqrt{\phi} = \sum_{k=0}^m ek(A_k \cos k \psi + B_k \sin k \psi) \quad (2-4)$$

5. MATHEMATICAL ACCURACY. Simple mathematics, such as the additions or subtractions in a column and the percentages of identified quantities, should be checked editorially and confirmed, with errors identified and reported to the author as a query. Mathematical symbols should be compatible throughout and conform to standard practice. Equations are centered in from margins two spaces below the text. If an equation needs to be divided, break before +, -, =, and such mathematical signs. Equations and explanations are aligned on the equal signs and centered on the longest line. The equations are numbered consecutively in each chapter (as 1-1, 1-2, 1-3), enclosed in parentheses, and set flush right:

EQUATION: E = equation (1-1)

Vertical alignment = on the = sign

Horizontal alignment = on the division  
line

6. MAPS AND DRAWINGS. For help in this area, see Figure 3-3.

7. NUMBERS. The presentation of numerical data (dimensions, tolerances, measurements and equations) is one of the more important considerations when writing OFP technical reports. Effective communication and technology transfer is based in part upon gaining the confidence of the reader. While the data may be extremely accurate, presentation of the information in a confusing, inconsistent and nonstandard manner will cause the reader to doubt its validity and reliability. General rules dealing with numbers that are standard within the field of technical writing are provided in Appendix A.

8. FINAL PRINTING. Final printing will be on 8" by 10- $\frac{1}{2}$ " paper stock. The typing will be single spaced to save paper, and printed on both sides of the paper.

Abbreviations most commonly used in technical publications follow. GPO Style Manual and Navy equivalents are provided. Either form is correct but consistency must be adhered to throughout the text.

	NAVY	GPO
ampere	amp	A
centigrade	c	C
cubic feet per minute	cfm	ft <sup>3</sup> /min
cubic feet per second	cfs	ft <sup>3</sup> /s
cycles per second	cps	c/s
cubic feet	cu ft	ft <sup>3</sup>
cubic inches	cu in	in <sup>3</sup>
cubic yards	cu yd	yd <sup>3</sup>
decibel	db	dB
degree	deg, °	(same)
feet per minute	fpm	ft/min
feet per second	fps	ft/s
foot, feet	ft	(same)
foot pound	ft lb	ft-lb
gram	g	(same)
gallon	gal	(same)
hour	hr	h
inch, inches	in	(same)
kilocycle	kc	(same)
kilogram	kg	(same)
kilometer	km	(same)
kilowatt	kw	kW
kilowatt hour	kwh	kWh
liter	l	(same)
pound	lb	(same)
pound-foot	lb ft	lb/ft
pound-inch	lb in	lb/in
megacycle	mc	Mc
megacycles per second	mcs	Mc/s
mile	mi	(same)
milliliter	ml	(same)
millimeter	mm	(same)
miles per gallon	mpg	mi/gal
miles per hour	mph	mi/h
miles per hour per second	mphps	mi/h/s
ounce	oz	(same)
pounds per square foot	psf	lb/ft <sup>2</sup>
pounds per square inch	psi	lb/in <sup>2</sup>
pounds per square inch absolute	psia	lb/in <sup>2</sup> a
pounds per square inch gage	psig	lb/in <sup>2</sup> g
square foot	sq ft	ft <sup>2</sup>
square inch	sq in	in <sup>2</sup>
ton	t	ton
volt	v	V
watt	w	W
watthour	whr	Wh
yard	yd	(same)

FIGURE 3-1  
Common Abbreviations

$+$	plus, sign of addition	$\alpha$	varies as
$-$	minus, sign of subtraction	$\sqrt{\quad}$	square root
$\pm$	plus or minus	$\sqrt[n]{\quad}$	$n$ th root
$\mp$	minus or plus (used with $\pm$ )	$\sqrt{\quad}$	ultraradicals, solution of the general quintic equation
$\times$	times, sign of multiplication	$\sqrt{\quad}$	
$\div, :$	signs of division	$( ), [ ], \{ },$	usually used in the order shown to indicate that quantities within them are to be taken together
$/$	(through a symbol of operation) negates the operation	$< >, \ll \gg$	
$=$	is equal to	$\infty$	infinity sign
$\neq$	is not equal to	$i$	$\sqrt{-1}$
$\approx$	approaches (should not be used)	$\bar{z}$	complex conjugate of $z$
$>$	is greater than	subscripts	position in a sequence, set, or matrix; limitation or identification of the term as defined
$\nlessgtr$	is not greater than	superscripts	powers; order of differentiation; identification or limitation of the term as defined
$\gtrapprox$	is greater than approximately equal to	$:, :: x:y::a:b$	proportion signs, $x$ is to $y$ as $a$ is to $b$
$<$	is less than	$1.\overline{14}$	repeating decimal, bar covers part that is to be repeated
$\nlessgtr$	is not less than	$1/M$	$\log_e 10$
$\gtrapprox$	is less than approximately equal to	$\{x x^2=0\}$ or $\{x:x^2=0\}$	the set of $x$ such that $x^2=0$
$\gtrlessgtr$	is greater than or equal to	iff	if and only if
$\gtrlessgtr$	is equal to or greater than	$\exists$	there exists
$\nlessgtr$	is not greater than or equal to	German letters	space, set, class, field, occasionally a special function or equation
$\lessgtr$	is less than or equal to	Script letters	space, set, class, field, occasionally a special function or equation
$\lessgtr$	is equal to or less than	Gothic bold letters	space, set, class, field, occasionally a special function or equation
$\nlessgtr$	is not less than or equal to		
$\lessgtr$	is not equal to; greater than or less than; less than or greater than		
$\sim$	is approximately equal to, similar to, proportional to		
$\approx$	is approximately equal to		
$\equiv$	is identical with		
$\nlessgtr$	is not identical with		
$\approx$	is approximately identical to		

FIGURE 3-2  
Signs and Symbols

1. Map sizes reduced will be as follows: 14-1/2 x 21 inches with an image size of 14 x 20 inches.
2. Maps will be flat sheet when bound in a 15-1/2 x 23 inch binder.
3. When maps are designed to fit a 9-3/4 x 11 inch binder the maps shall be folded 10 inches top margin (approximately 4-1/4 inches down from the top of the sheet and folded to bind to leave the title block showing). Folds will be approximately 6-1/2 inches. Cut on bind edge for fold in 3/4 inch from left sheet size. Engineering drawings follow these same specifications.
4. Cross hatching should not be printed on color maps.
5. Engineering drawings reduced to half size follow the specifications for maps.

FIGURE 3-3  
Specifications for Maps and Drawings

## CHAPTER 4. LEGAL RESPONSIBILITIES

1. GENERAL. Writers of technical reports have the following responsibilities.

a. Copyright Law. The copyright law protects writers by making it illegal to copy their work. This right is binding for 28 years, is renewable at the end of this period for a second 28 years, after which time the work falls into the public domain. No copyrighted material can be published without written permission of the copyright holder. (A revision to the copyright law, which will be effective 1 January 1978, will grant a copyright that lasts the author's lifetime plus 50 years. Works copyrighted before 1 January 1978 will be given a flat 75-year protection. This revision will also limit the photocopying of copyrighted written works.)

The editor must determine whether copyrighted material will be included in technical reports, and whether copyright permission has been obtained. It is the writer's responsibility to alert the editor to that material which has, in fact, been taken from a copyrighted source. It is the editor's responsibility to obtain the copyright clearance. Every copyright clearance obtained must contain a statement on the document's sale or availability to the public.

When the copyrighted material is reprinted in a Government publication, a notice of copyright must be included in the text in order that the public not be misled. (Copyright notices will be subordinated in size of type to that of both text and legends for illustrations.)

b. Libel Law. Although it is unlikely that any FPO-1 publication would contain libelous material, every writer should be aware of the risks of libel and be alert to its avoidance. The libel law protects a person from having his/her reputation assailed by false and defamatory imputations. It is a criminal offense to write, print, or publish such an imputation.

c. Security of Classified Information. All classified matter contained in a technical report shall be handled in accordance with the current U.S. Navy security regulations and with the Department of Defense Industrial Security Regulations, as appropriate. The production of classified technical documents imposes certain restrictions. Only persons with the appropriate security clearance can work on the classified material. These persons are responsible for the material's custody, stowage, and accountability.

d. Contract Writers' Clearance. It is the contractor's responsibility that data produced in the performance of a contract is the sole property of the Government. The Government, however, is not liable for

contract work that violates proprietary rights, copyright, or right of privacy that arises out of the publication of the data furnished under the contract.

e. Advertisements. No Government publication or printed matter can contain advertisement for a person, firm, or corporation, or contain material that implies that the Government endorses or favors a specific commercial product, commodity, or service.

APPENDIX A  
NUMERALS



## APPENDIX A. NUMERALS

1. Most rules for the use of numerals are based on the general principle that the reader comprehends numerals more readily than numerical word expressions, particularly in technical, scientific, or statistical matter.
2. The following rules cover the conditions most often used in technical writing.

### Measurement and time

Units of measurement and time, actual or implied, are expressed in figures.

- a. Age:  
6 years old
- b. Clock time (see also Time):  
4:30 p.m.  
0025 (military time)
- c. Dates:  
15 April 1971 (military)
- d. Decimals:  
0.25 inch; 1.25 inches  
specific gravity 0.9547  
gage height 10.0 feet
- e. Degrees, etc.:  
longitude  $77^{\circ}04'08''$ E.  
latitude  $49^{\circ}26'14''$ N.  
 $35^{\circ}30'$ ;  $35^{\circ}30'$ N.  
 $45.5^{\circ}$  to  $49.5^{\circ}$  below zero  
an angle of  $57^{\circ}$
- f. Mathematical expressions:  
multiplied by 3  
divided by 6
- g. Measurements:  
7 meters  
about 10 yards  
8 by 12 inches  
8 by 12-inch page  
2 feet by 1 foot 8 inches by 1 foot 3 inches

1½ miles  
6 acres  
1 gallon  
60μ  
2,500 horsepower  
15 cubic yards  
80 foot-pounds

- h. Money:  
\$3.65; \$0.75; 75 cents; 0.5 cent  
\$3 (*not* \$3.00) per 200 pounds
- i. Percentage:  
12 percent; 25.5 percent; 0.5 percent
- j. Proportion:  
1 to 4
- k. Time (see also Clock time):  
6 hours 8 minutes 20 seconds  
10 years 3 months 29 days  
8 days  
7 minutes  
1 month  
3 fiscal years
- l. Unit modifiers:  
5-day week  
8-year-old cable  
8-hour day  
10-foot pole  
½-inch pipe

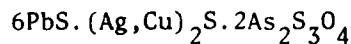
#### Punctuation

The comma is used in a number containing four or more digits:

4,000  
40,000

#### Chemical formulas

In chemical formulas full-sized figures are used before the symbol or group of symbols to which they relate, and inferior figures are used after the symbol.



### Fractions

Fractions standing alone, or if followed by *of a* or *of an*, are generally spelled out.

three-fourths of an inch; *not*  $3/4$  inch *nor*  $3/4$  of an inch

one-half inch

one-half of a farm; *not*  $1/2$  of a farm

one-fourth inch

**END**

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